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Abstract

PREPARATION OF DENSE PARTICLES OF THORIUM AND URANIUM OXIDES

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A method for the preparation of dense thorium and uranium oxide particles which does not require the use of high temperatures, except for the final firing step, was investigated.

The method was based on the trend of thorium and uranium salts to form spatial micromolecules, when in very concentrated solutions and in highly acid-deficient conditions.

Depending on the water content, the anion/cation molar ratio and the preparation process, a product ranging from a colloidal suspension to a more or less fluid glassy gel is obtained.

In the step of a very fluid gel, the product can be shaped (in the form of small spheres, for instance) and consolidated by further water or anion withdrawal and/or by a partial satisfaction of the remaining anions.

Lastly, upon firing, dense particles with peculiar features are obtained (for instance the thorium oxide particles look transparent under the optical microscope).

Details regarding a method of producing concentrated uranium (IV) nitrate solutions (which can be one of the starting products), their stability against oxidation and the analytical control methods are supplied.

The preparation and control methods for the fluid gels to be shaped are briefly reported.

The shaping of the spherical particles and the most important properties of the fired final products are outlined.